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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,492	02/12/2002	Jun Sudo	G110-044 US	4081

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EXAMINER

COCKS, JOSIAH C

ART UNIT	PAPER NUMBER
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3749

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/049,492

Applicant(s)

SUDO ET AL.

Examiner

Josiah C. Cocks

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The preliminary amendment filed 2/12/02 is acknowledged and has been entered.

Drawings

2. The drawings filed with the application on 2/22/02 are accepted by the examiner.

Specification

3. The disclosure is objected to because of the following informalities: The body of the specification refers to specific claim numbers (e.g. see page 11, lines 2 and 7, and page 13, line 20). During the course of prosecution, claim numbers are often changed rendering references to claims within the specification inaccurate. Applicant is requested to review the entire specification and remove any references to claims numbers therein.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 3, 4, 6, 8-12, 16, 18, and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* (US # 5,441,403).

Tanaka et al. disclose in Figures 1-12 a combustion method and furnace having a burner substantially as described in applicant's claims 1, 3, 4, 6, 8-12, 16, 18, and 24-28, including directing air into an air throat (9) that has a plurality of air inlet openings (11) that cause air flows to collide with one another and are then directed to an outlet that is rectangular (i.e. a cross section having a larger specific surface area than a circular outlet) (see Fig. 9). *Tanaka et al.* also disclose a plurality of fuel outlets (4) forming fuel jet flows that surround the air flows are arranged to collide with the central air flows and form a flat flame shape (see col. 3, lines 11-19 and col. 6, lines 13-21).

In regard to the claims 1 and 11, selecting a furnace temperature of not less than 800 °C is simply a matter of operational choice. The furnace of *Tanaka et al.* would be capable of operating at temperatures above 800 °C.

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In regard to claims 9, 10, 24, and 25, *Tanaka et al.* teach that it is understood in the art at air to fuel ratios may be adjusted as desired (see col. 4, lines 54-59). To have selected a specific quantity of air or fuel is regarded as simply a matter of engineering choice and is not regarded as patentably distinct.

In regard to claims 26 and 27, as noted above, *Tanaka et al.* discloses an arrangement of fuel and air nozzles that direct fuel and air to collide and form a flat flame in substantially the same manner as described by applicant, the examiner considers that, to have selected specific sizes of the air throat, and specific ratios of the diameter of the air throat to the fuel jet flow axis is simply a matter of engineering design choice and is not given any patentably weight.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claim 1 above and further in view of *Gitman* (US # 4,453,913).

Tanaka et al. discloses all the limitations of claim 2 except that the combustion air is pre-heated by combustion exhaust gas.

Gitman discloses a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Gitman* is a recuperative burner with regenerative medium that pre-heats combustion air by exposure to exhaust gas heat (see abstract and col. 5, lines 28-40).

Therefore, in regard to claim 2, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method and burner of *Tanaka et al.* to incorporate the preheating of *Gitman* as this preheating desirably contributes to minimizing NOx formation and increasing flame luminosity (see *Gitman*, col. 2, lines 6-22).

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8. Claims 5, 7, 17, 19, and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claims 1 and 11 above, and further in view of *Reed* (US # 3,202,203).

Tanaka et al. teach all the limitations of claims 1 and 11 except 5, 7, 17, 19, and 20 possibly that the fuel jet flows collide with each other before coming into contact with the air jet flow.

Reed teaches a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Reed* includes multiple fuel nozzles (42, 43, 46, and 47) forming multiple fuel flows wherein the ports are arranged such that the fuel flows are arranged and angles collide as the leave the flows exit the fuel ports (see Fig. 5, and col. 4, lines 10-25).

Therefore, in regard to claims 5, 7, 17, 19, and 20, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method and burner of *Tanaka et al.* to incorporate the fuel port arrangement and colliding fuel flows of *Reed* as the colliding fuel flows cause flattening of the fuel streams as they issue from the fuel ports (see *Reed*, col. 4, lines 18-20) and provide adequate heat and stable combustion (see *Reed*, col. 1, lines 56-67).

9. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claim 11 above, and further in view of *Yap* (US # 5,360,171).

Tanaka et al. teach all the limitations of claims 13-15 except possibly that the air throat is divided into a plurality of small holes that are arranged in a line and not independent from one another.

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Yap teaches a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Yap* includes a rectangular air outlet (92 or 94) that is broken up into non-independent exit holes by means of several vanes (96 or 98) and arranged in a line (see Fig. 6).

Therefore, in regard to claims 13-15, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the burner of *Tanaka et al.* to incorporate the multiple oxidant outlet holes of *Yap* as this arrangement allows for combustion staging that lowers NO_x formation (see *Yap*, col. 2, lines 53-61).

10. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claim 11 above, and further in view of *Mitani et al.* (US # 6,036,476).

Tanaka et al. teach all the limitations of claims 21-23 except for a ceramic honeycomb regenerative medium and flow switching means for alternately leading combustion exhaust gas and combustion air to the regenerative medium.

Mitani et al. teach a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Mitani et al.* includes a regenerative medium (3) made of ceramic (see col. 5, lines 1-3) and switching means (21) for switching air supply and exhaust gas (see col. 9, lines 37-45 and Fig. 19).

Therefore, in regard to claims 21-23, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the burner of *Tanaka et al.* to incorporate the regenerative medium and switching means of *Mitani et al.* as these structures desirably aid in the reducing the generation of NO_x (see *Mitani et al.*, col. 8, lines 8-24).

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Conclusion

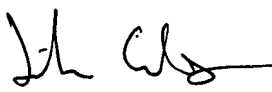
11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. *Kikutani et al.*, *Joshi et al.* ('367), *Jones, Joshi et al* ('438)., JP 60-233401, and JP 11-22915 are included to further show the state of the art concerning burners with colliding air and/or fuel flows.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Josiah Cocks whose telephone number is (703) 305-0450. The examiner can normally be reached on weekdays from 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ira Lazarus, can be reached at (703) 308-1935. The fax phone numbers for this Group are (703) 308-7764 for regular communications and (703) 305-3463 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

jcc
October 19, 2003


JOSIAH COCKS
PATENT EXAMINER
ART UNIT 3749